Joint Australian and Canadian Pole Side Impact Research

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Program Overview

- Paired comparisons of 29 km/h perpendicular and 32 km/h oblique pole side impact tests.
- WorldSID 50\textsuperscript{th} percentile adult male with RibEye used on the struck (left) side of each vehicle.
- WorldSID 50\textsuperscript{th} percentile adult male with IRTRACC used on the non-struck (right) side of each vehicle.
- Fiat 500 vehicles tested:
  - Results compared from matched tests of the Australian market vehicle and the Canadian market vehicle.
The Australian and Canadian models had different airbag control modules.

This may be partly due to frontal impact differences (but not entirely).
Fiat 500

Side Impact Sensors (Peripheral Pressure Sensing)

- Canadian model had a side door cavity pressure sensor that Australian model did not.
- Both models had b-pillar acceleration sensors (but these were mounted in different locations).
Fiat 500

Side Curtain and Thorax Airbag Coverage (front row)

- The Canadian model had a larger curtain airbag.
- The Canadian model thorax airbag was larger, more integrated with the curtain and appears to provide more coverage of the shoulder, upper arm and lower pelvis.
The US model appears to have the same side head curtain and thorax airbag design as the Canadian model.
Fiat 500

Side Curtain Airbag Coverage (rear row)

Australian Model

- The Australian model side curtain airbags end near the b-pillar (i.e. are for the front row occupants only).

Canadian Model

- The Canadian model had a side curtain airbag that extended to the second row.
Fiat 500

32 km/h Oblique Pole Test Footage

Australian Model

Canadian Model
Fiat 500

32 km/h Oblique Pole Test Footage

Australian Model

Canadian Model
Head injury risk has been determined using the Prasad/Mertz AIS 3+ skull fracture probability risk function published in FMVSS 214 Final Regulatory Impact Analysis (August 2007).

HIC36 (excluding dummy occupant-to-occupant head interactions / calculated for t < 80ms)

50% AIS 3+ Head Injury Risk

30% AIS 3+ Head Injury Risk
Shoulder injury risk has been determined from the AIS 2+ (survival method) shoulder injury risk values published by Petitjean et al., Stapp 2009.
Thorax Injury Risk has been determined from the AIS 3+ (survival method) thorax injury risk values (adjusted to 45 year old) published by Petitjean et al., Stapp 2009.

Note: Each IRTRACC deflection has been calculated from middle RibEye LED x, y and z axis channel data.

Thorax injury risk has been determined from the AIS 3+ (survival method) thorax injury risk values (adjusted to 45 year old) published by Petitjean et al., Stapp 2009.

Note: Each IRTRACC deflection has been calculated from middle RibEye LED x, y and z axis channel data.
Pelvis injury risk has been determined from the AIS 3+ (survival method) pelvis injury risk values (adjusted to 45 year old) published by Petitjean et al., Stapp 2009.
Airbag Deployment

Australian Model

Canadian Model
Residual Deformation

OBLIQUE COMPARISONS

- Level 3 Pre
- Level 3 Post
- Level 4 Post
- Level 3 post CDN 1
- Level 4 post CDN 1
- Level 3 post CDN 2
- Level 4 post CDN 2

FRONT
OBLIQUE INTRUSION PROFILE COMPARISON

Max Vertical Deformation

door trim post CDN 1

door trim post CDN 2

max vertical deformation CDN 1

max vertical deformation CDN 2
Residual Deformation

PERPENDICULAR COMPARISONS

- Level 2 Post
- Level 3 Post
- Level 4 Post
- Level 2 Aus post
- Level 3 Aus post
- Level 4 Aus post

FRONT
PERPENDICULAR INTRUSION PROFILE COMPARISON

- Door Trim Post-Test
- Max Vertical Deformation
- Door trim AUS post
- Max deformation Aus

Z [mm] vs. Y [mm] graph showing deformation profiles.
Undercarriage
Undercarriage

CANADIAN

AUSTRALIAN
Undercarriage

CANADIAN

AUSTRALIAN
Undercarriage
Summary

- Australian and Canadian market Fiat 500s have different airbag control modules, different side impact sensors and different side airbags.

- Canadian Fiat 500 side airbags look the same as the US Fiat 500 side airbags.

- WorldSID 50th percentile male dummy responses indicate similar AIS 3+ head and pelvis injury risk for the Australian and Canadian Fiat 500 models.

- WorldSID 50th percentile male dummy responses indicate a significantly lower AIS 3+ thorax injury risk for the Canadian model.

- Results from repeated 32 km/h oblique pole tests of Canadian Fiat 500 show good WorldSID 50th male repeatability.
Thank you